FIG. 1

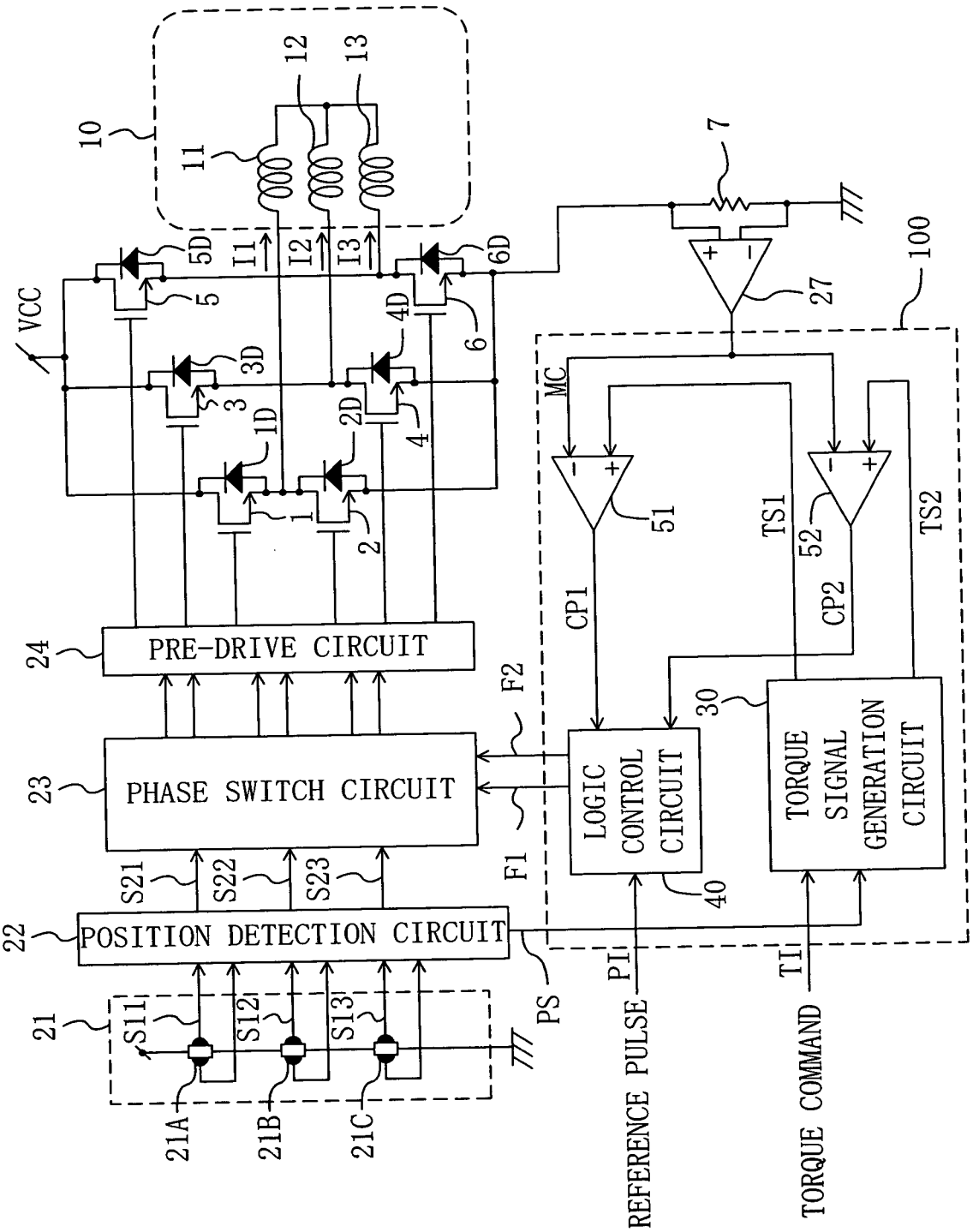

10
11
12
13
I1
I2
I3
5D
6D
5
6
4D
3D
3
1D
2D
4
1
2
VCC
7
27
100
MC
51
52
TS1
TS2
CP1
CP2
24
PRE-DRIVE CIRCUIT
F2
23
PHASE SWITCH CIRCUIT
F1
30
TORQUE SIGNAL GENERATION CIRCUIT
LOGIC CONTROL CIRCUIT
40
S21
S22
S23
22
POSITION DETECTION CIRCUIT
PS
PI
TI
21
S11
S12
S13
21A
21B
21C
REFERENCE PULSE
TORQUE COMMAND

FIG. 2

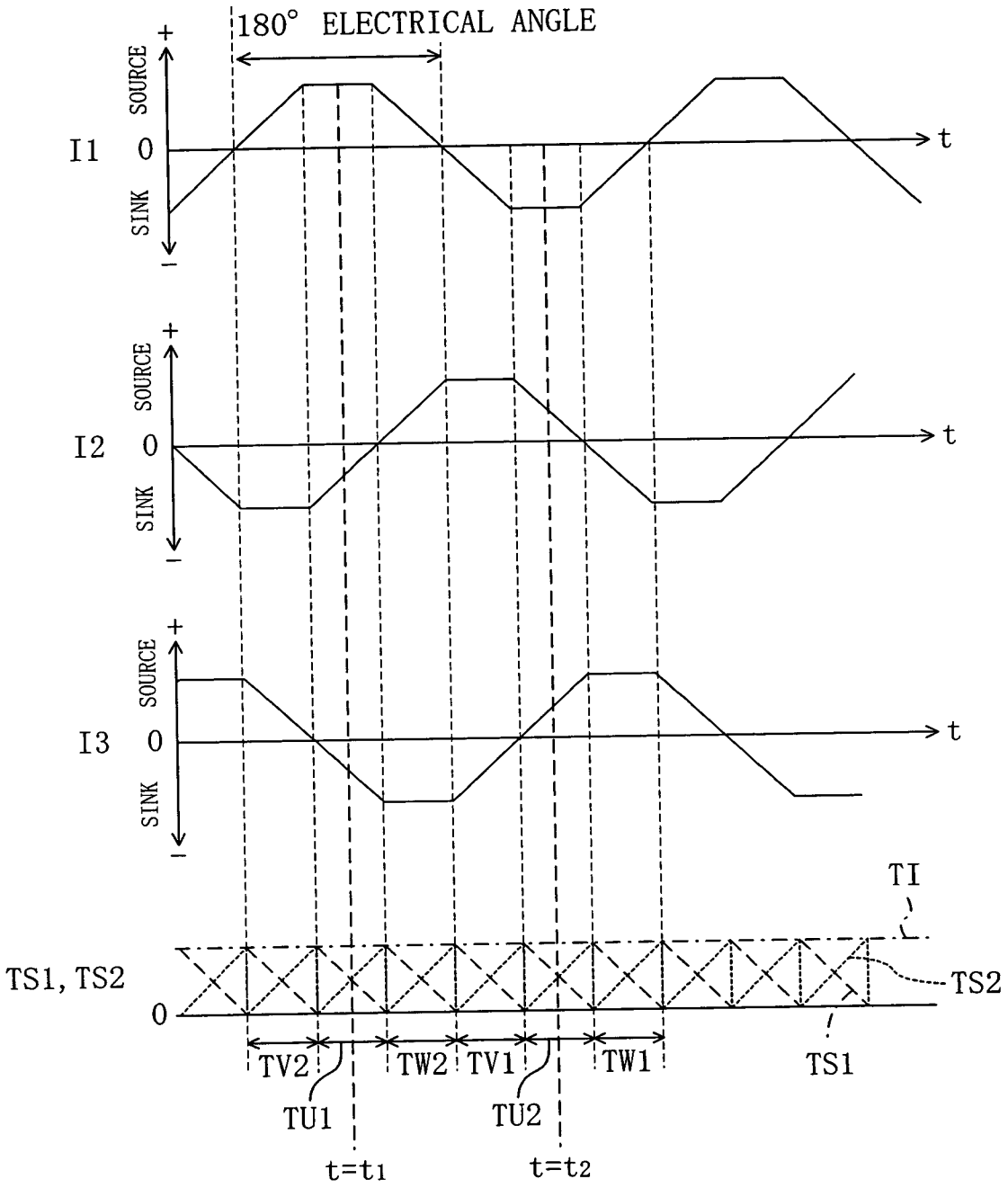

180° ELECTRICAL ANGLE
I1
I2
I3
SOURCE
SINK
+
0
−
t
TS1, TS2
TI
TS2
TS1
TV2
TW2
TV1
TW1
TU1
TU2
t=t1
t=t2

FIG. 3

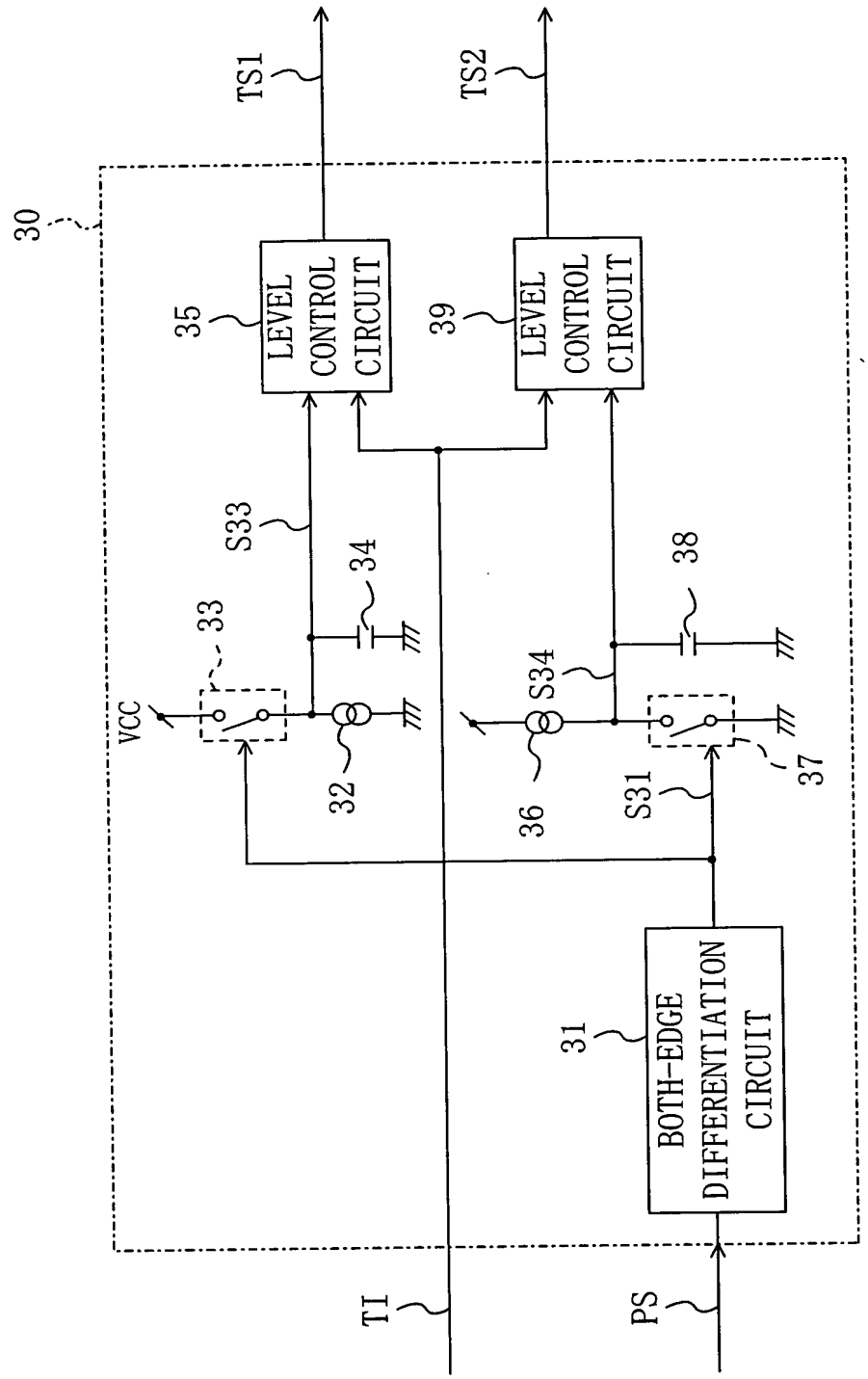

30
TS1
TS2
35
LEVEL CONTROL CIRCUIT
39
LEVEL CONTROL CIRCUIT
S33
34
38
33
VCC
S34
32
36
S31
37
31
BOTH-EDGE DIFFERENTIATION CIRCUIT
TI
PS

FIG. 4

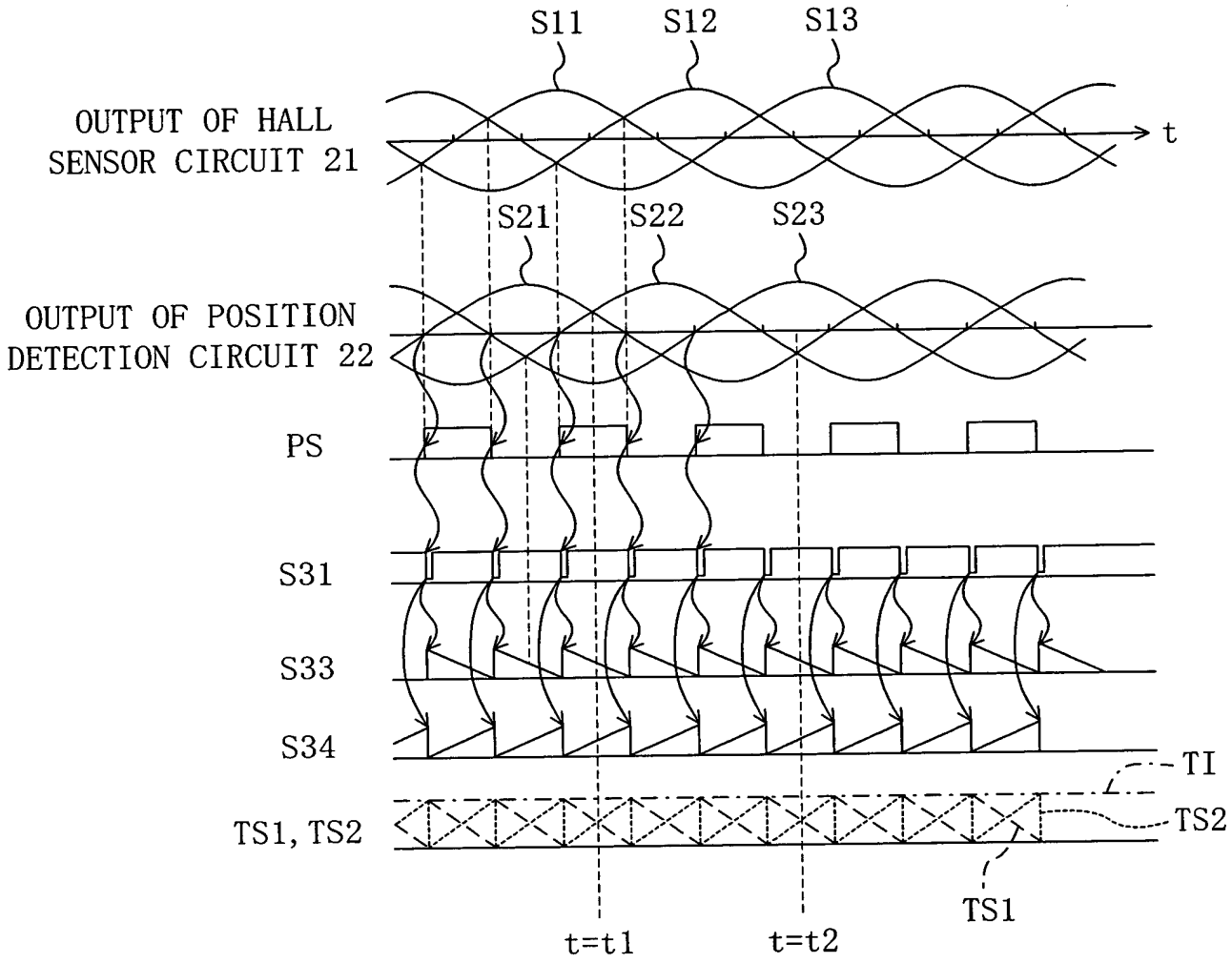

S11
S12
S13
OUTPUT OF HALL SENSOR CIRCUIT 21
t
S21
S22
S23
OUTPUT OF POSITION DETECTION CIRCUIT 22
PS
S31
S33
S34
TI
TS1, TS2
TS2
TS1
t=t1
t=t2

FIG. 5

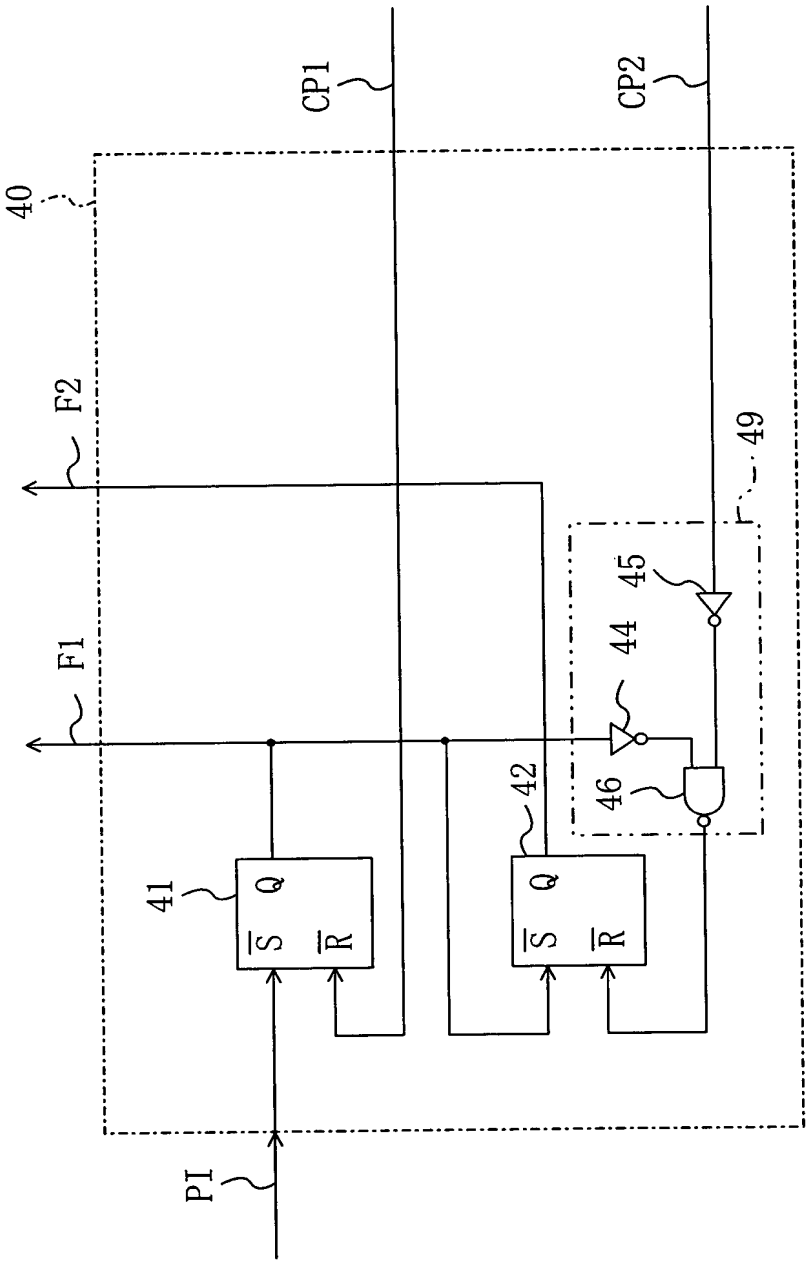


FIG. 6

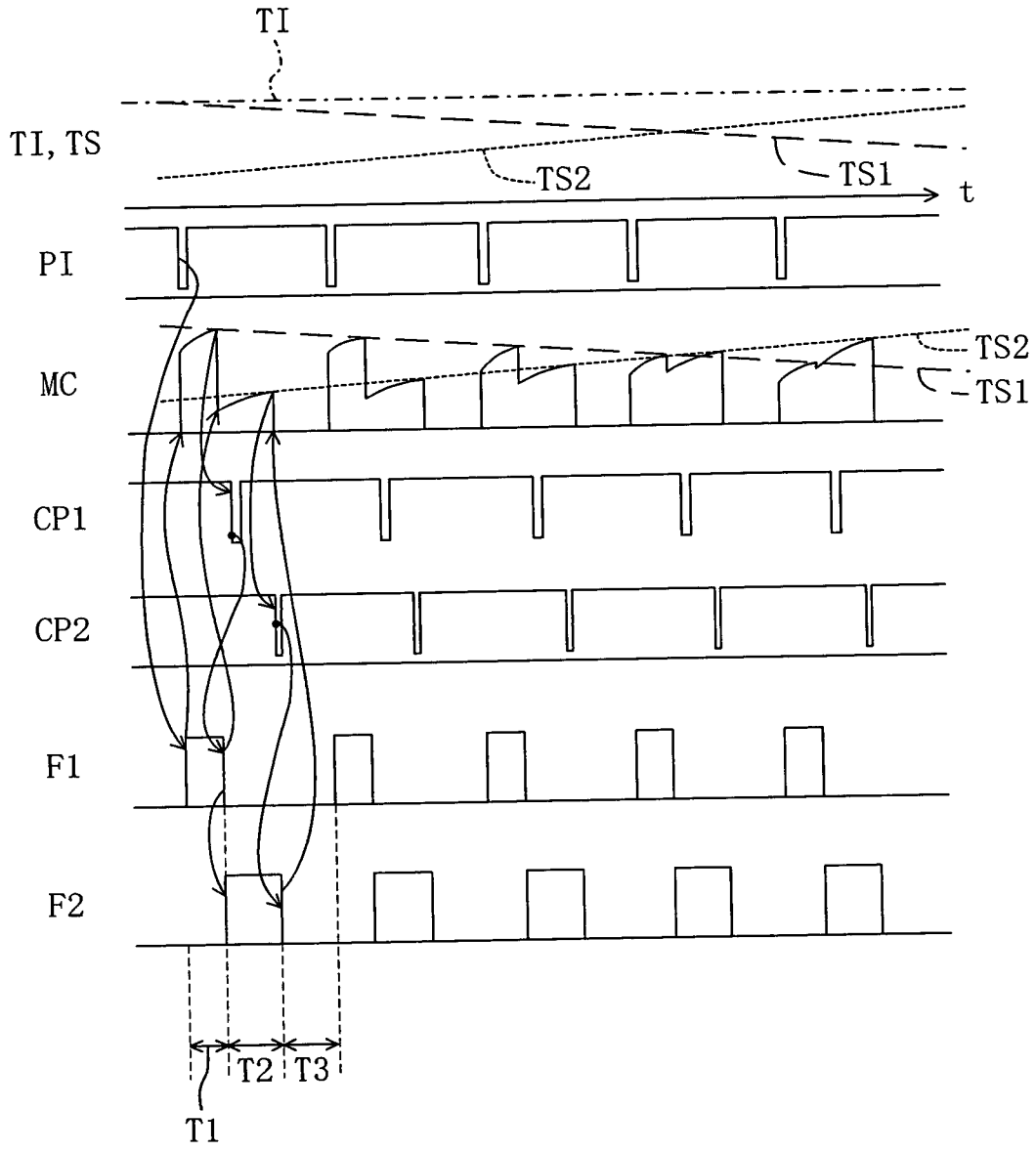


FIG. 7

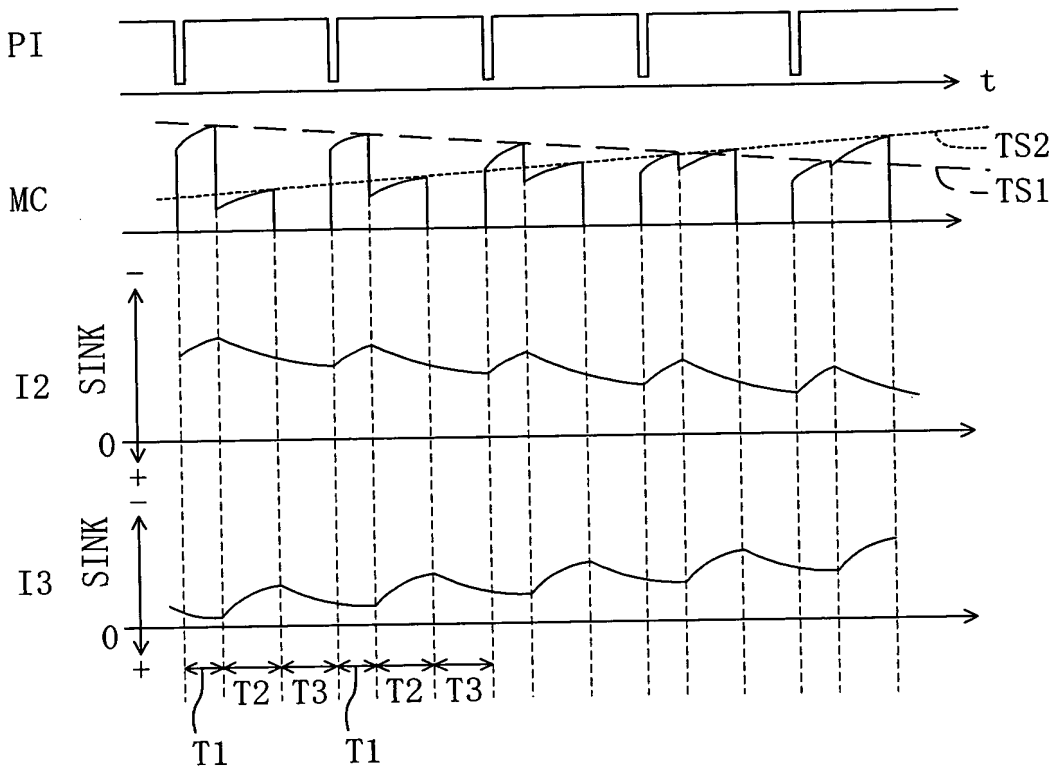


FIG. 8

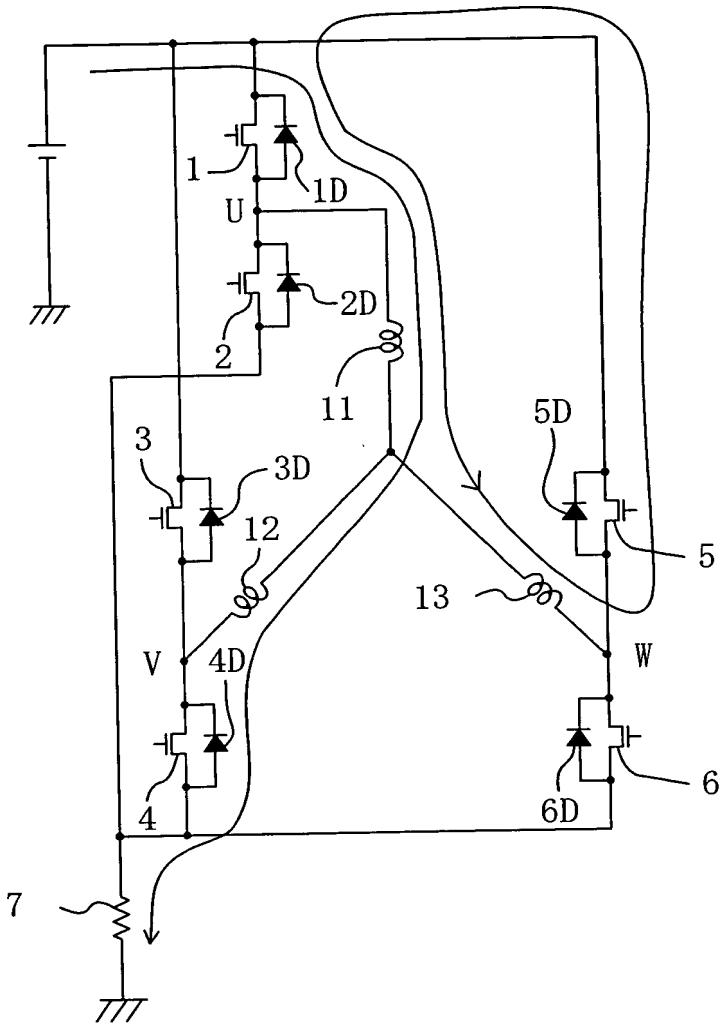


FIG. 9

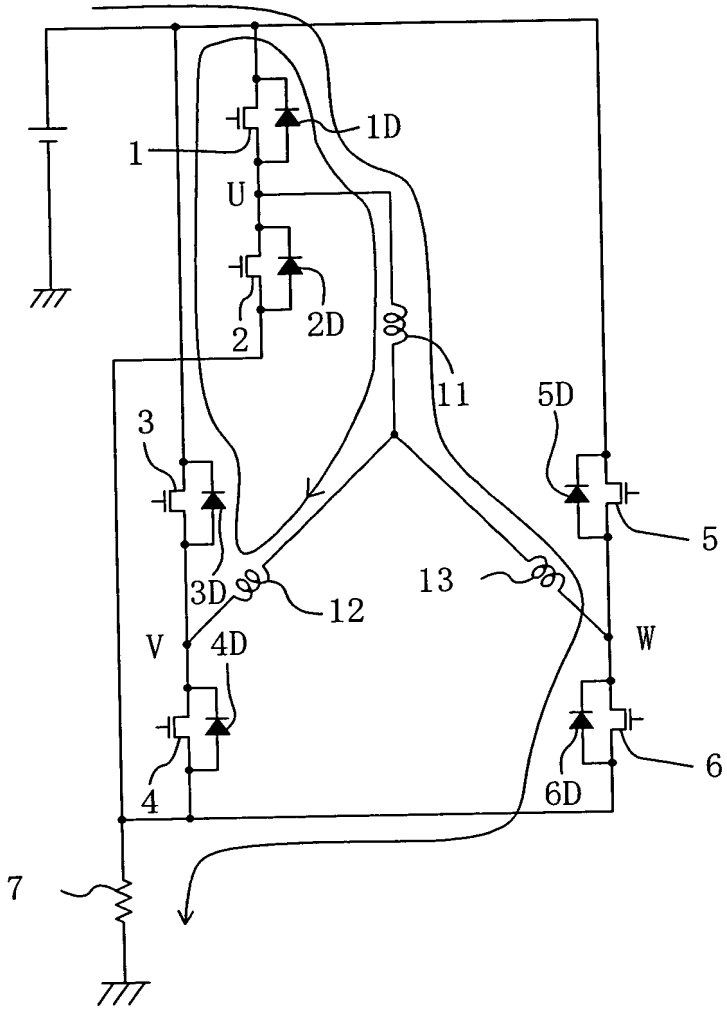


FIG. 10

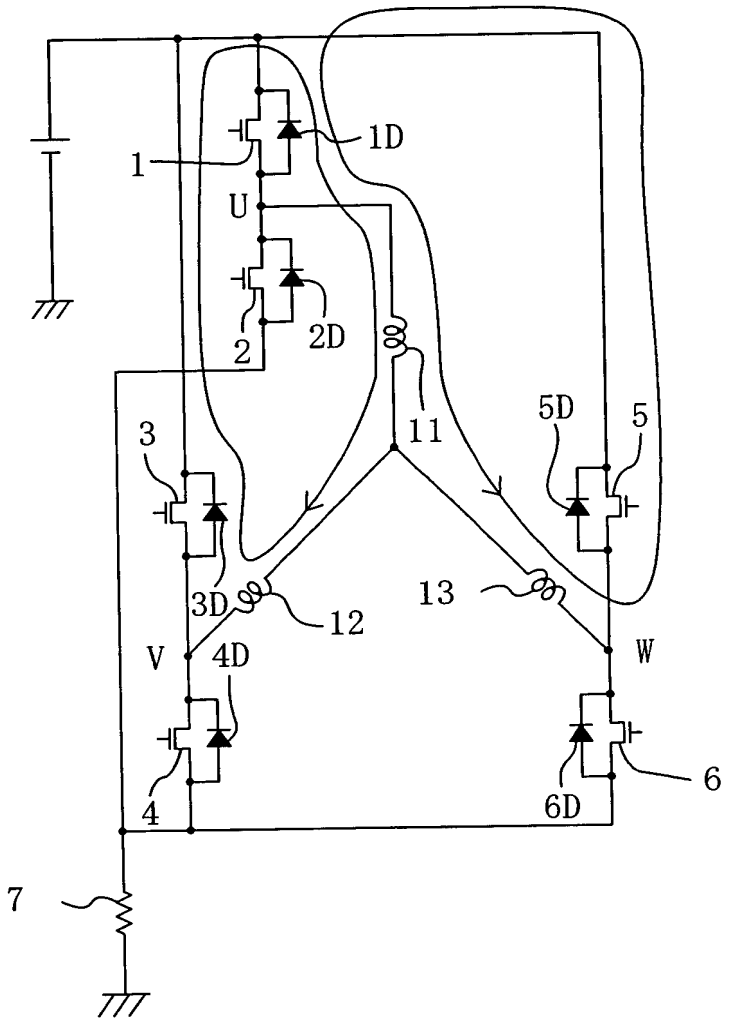


FIG. 11

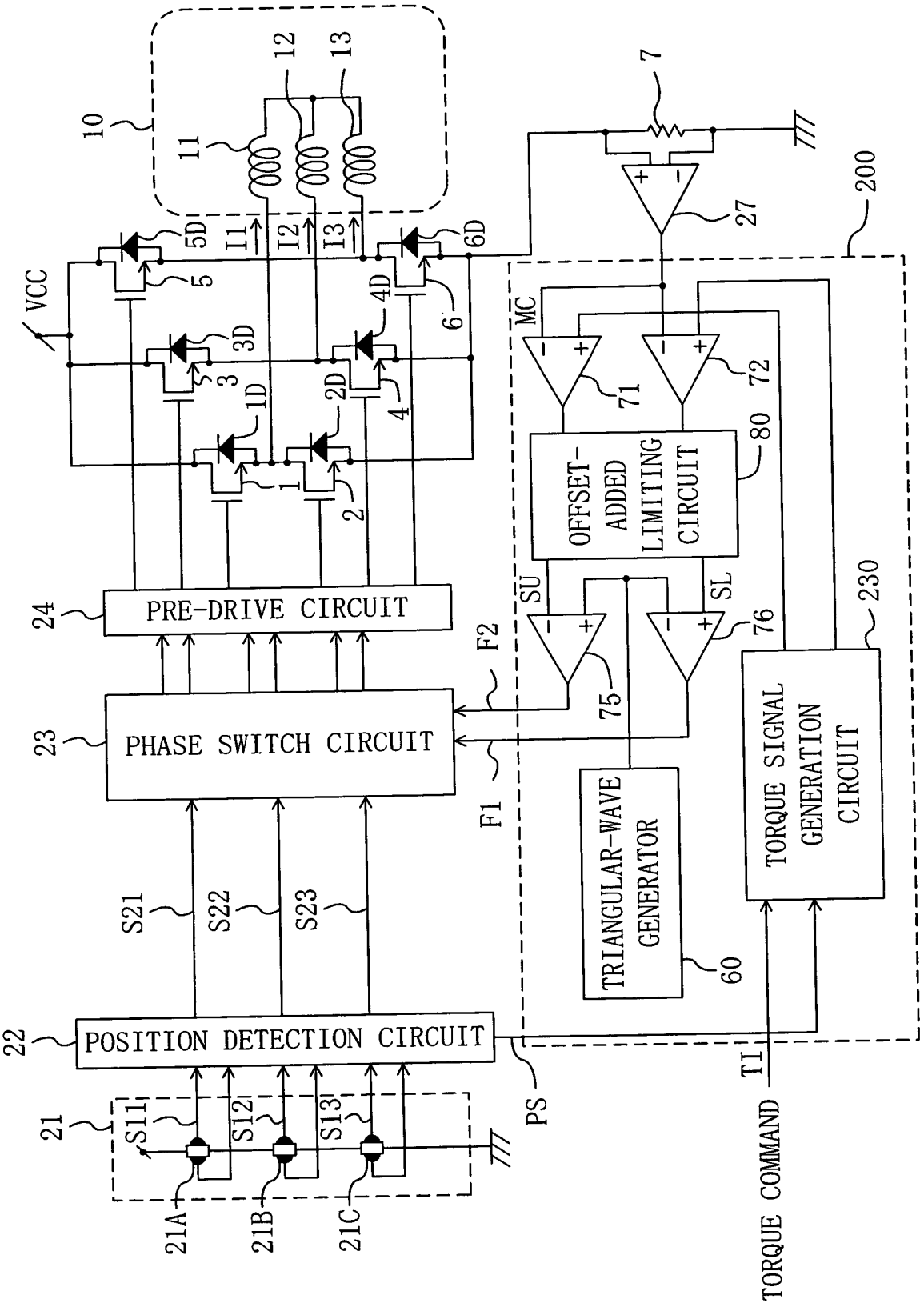

10
11
12
13
I1
I2
I3
5D
6D
4D
3D
1D
2D
5
6
4
3
1
2
VCC
7
27
200
MC
71
72
80
OFFSET-ADDED LIMITING CIRCUIT
SU
SL
75
76
230
TORQUE SIGNAL GENERATION CIRCUIT
24
PRE-DRIVE CIRCUIT
F2
23
PHASE SWITCH CIRCUIT
F1
TRIANGULAR-WAVE GENERATOR
60
S21
S22
S23
22
POSITION DETECTION CIRCUIT
PS
T1
TORQUE COMMAND
21
S11
S12
S13
21A
21B
21C

FIG. 12

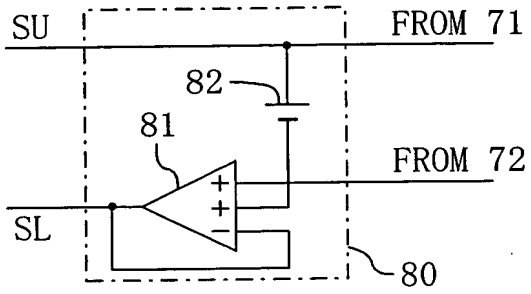


FIG. 13

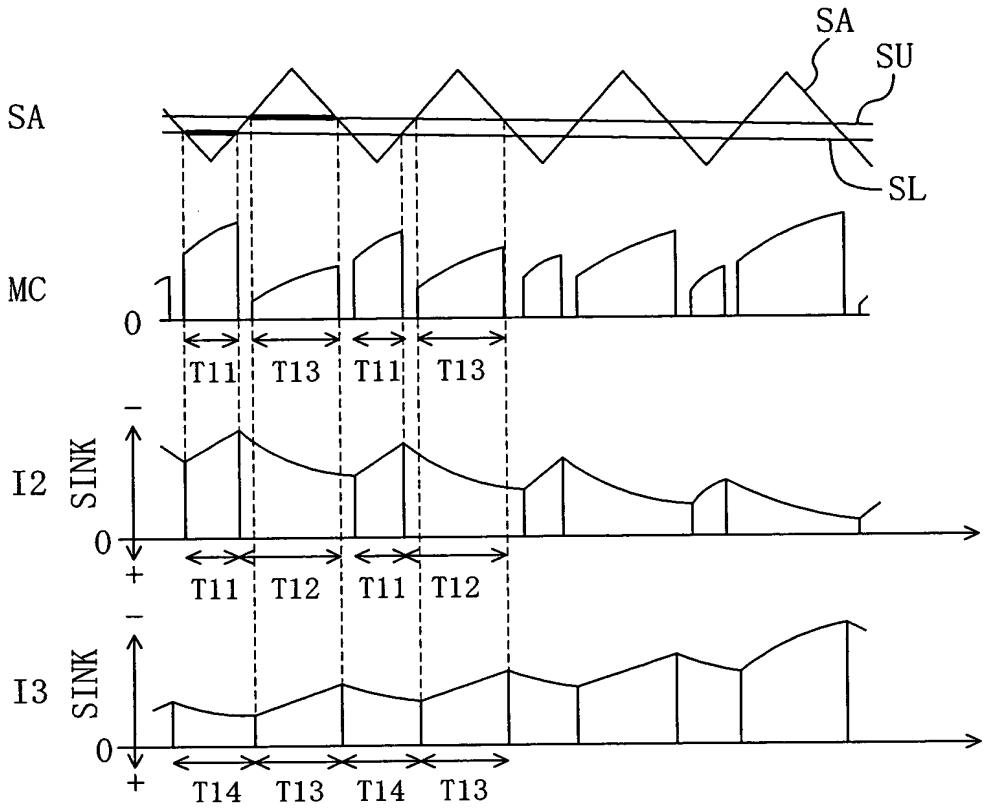

SA
SU
SL
SA
MC
0
T11
T13
T11
T13
I2
SINK
−
0
+
T11
T12
T11
T12
I3
SINK
−
0
+
T14
T13
T14
T13

FIG. 14

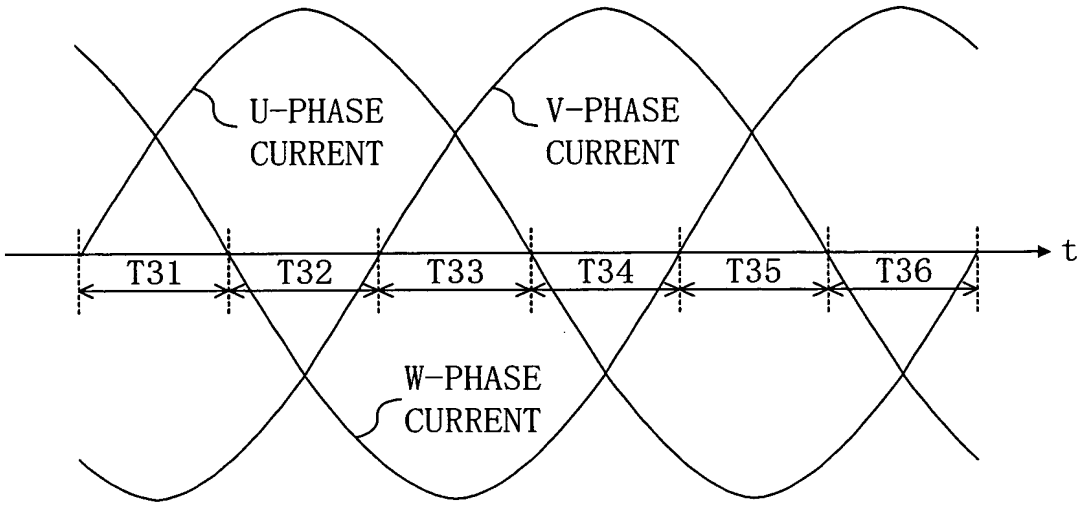

U-PHASE
CURRENT
V-PHASE
CURRENT
W-PHASE
CURRENT
T31
T32
T33
T34
T35
T36
t

FIG. 15

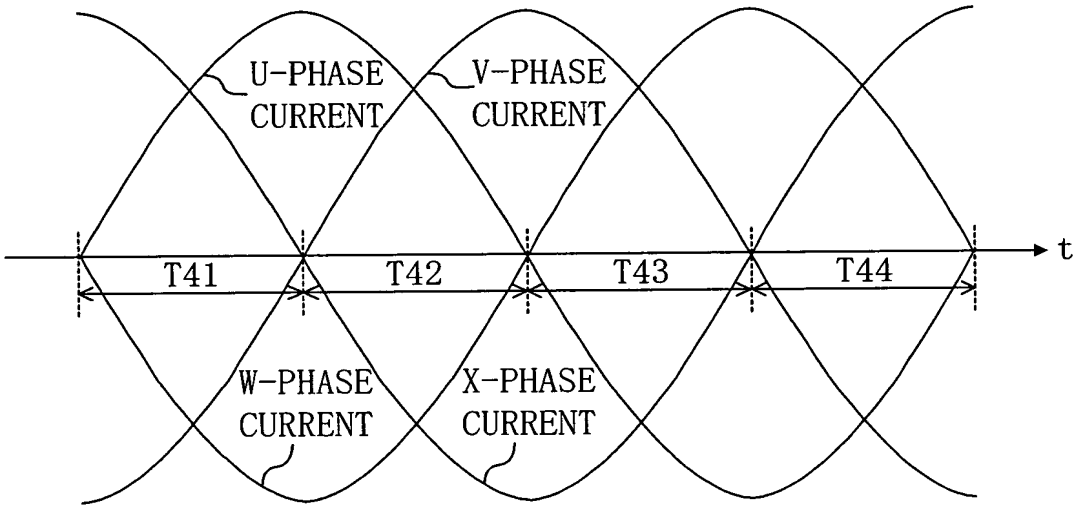

U-PHASE CURRENT
V-PHASE CURRENT
t
T41
T42
T43
T44
W-PHASE CURRENT
X-PHASE CURRENT

FIG. 16

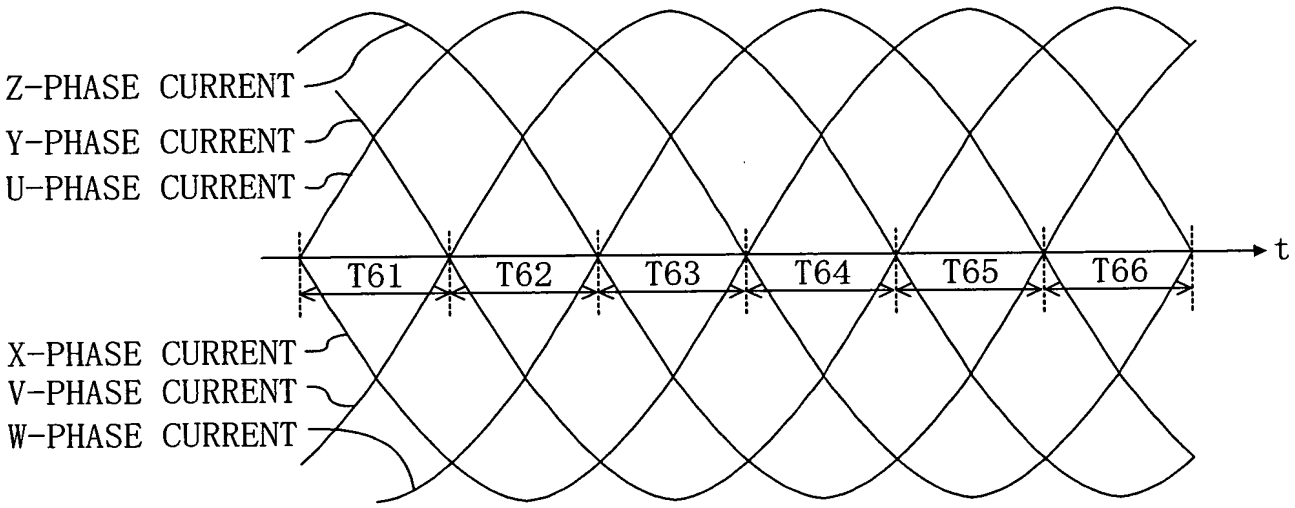

Z-PHASE CURRENT
Y-PHASE CURRENT
U-PHASE CURRENT
X-PHASE CURRENT
V-PHASE CURRENT
W-PHASE CURRENT
T61
T62
T63
T64
T65
T66
t

FIG. 17

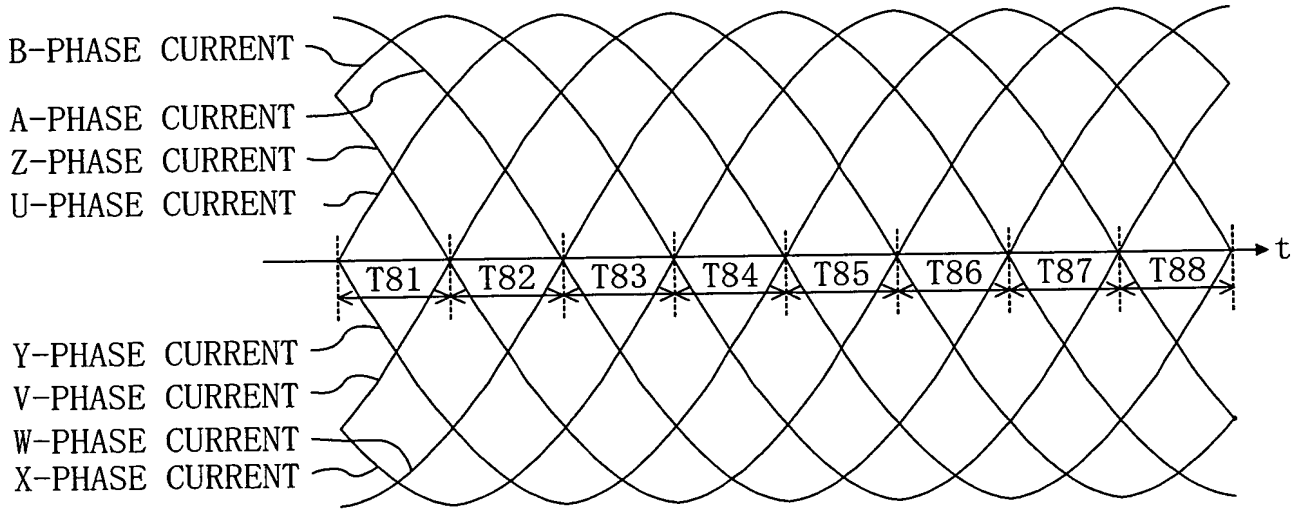

B-PHASE CURRENT
A-PHASE CURRENT
Z-PHASE CURRENT
U-PHASE CURRENT
Y-PHASE CURRENT
V-PHASE CURRENT
W-PHASE CURRENT
X-PHASE CURRENT
T81
T82
T83
T84
T85
T86
T87
T88
t

FIG. 18

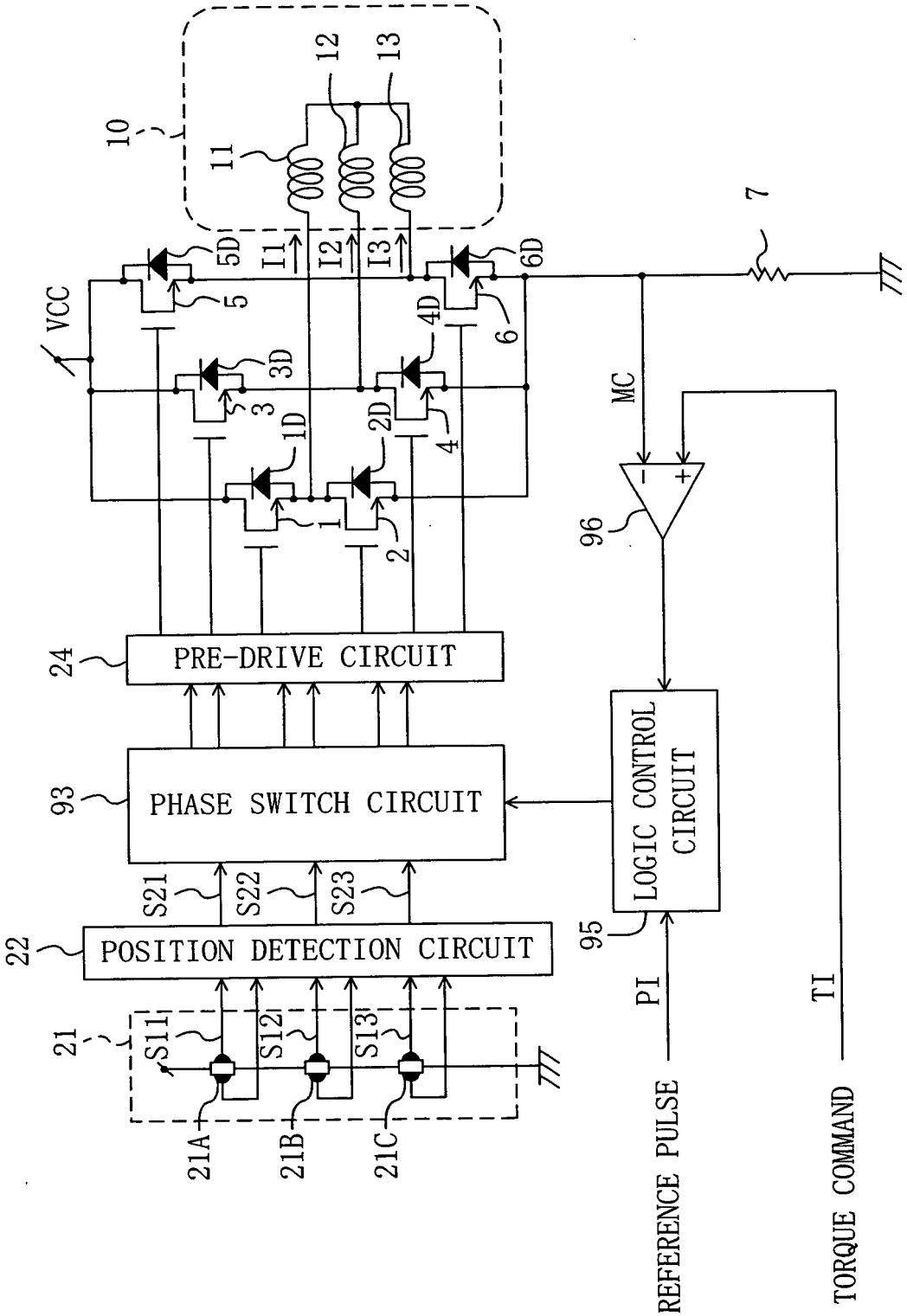

10
11
12
13
I1
I2
I3
5D
6D
4D
3D
1D
2D
VCC
5
6
3
4
1
2
7
MC
96
PRE-DRIVE CIRCUIT
24
PHASE SWITCH CIRCUIT
93
LOGIC CONTROL CIRCUIT
95
S21
S22
S23
POSITION DETECTION CIRCUIT
22
21
S11
S12
S13
21A
21B
21C
PI
TI
REFERENCE PULSE
TORQUE COMMAND

FIG. 19

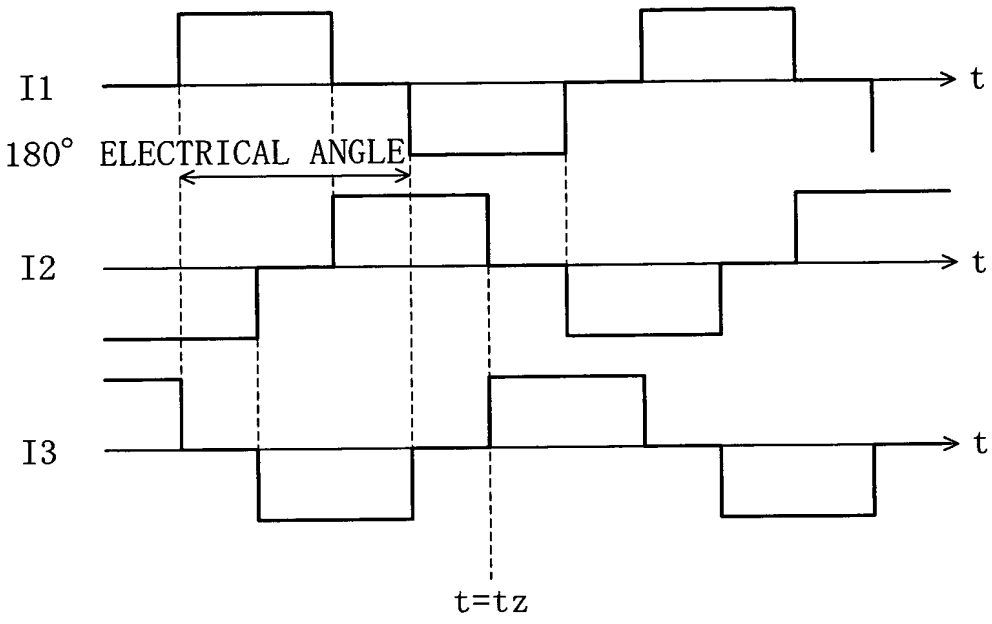


FIG. 20

